



# BUILDING AMERICA— NEW HOMES



## Partnerships for Home Energy Efficiency

Partnerships for Home Energy Efficiency (PHEE) is a new, multi-agency effort of the federal government to bring greater energy efficiency to the U.S. housing market with a goal of helping households cost-effectively save 10 percent or more on home energy bills over the next decade. The Initiative builds upon existing policies and programs and works in partnership with manufacturers, retailers, home contractors and remodelers, utilities, states, financial organizations, and educational institutions, among others, to leverage the power of the marketplace. Collaborative efforts can significantly improve the efficiency of America's housing stock over the next decade, bringing better, cost-effective services, technologies, practices, and designs into our homes and helping us all be part of the energy efficiency solution. Savings of 10 percent on home energy bills would total almost \$20 billion a year. These efforts would also help increase the affordability and comfort of homes, reduce demand for natural gas by more than 1 quad, avoid the need for 40 new 600 MW power plants, and avoid the greenhouse gas emissions equivalent to those from more than 25 million vehicles.

## Building America

The U.S. Department of Energy (DOE) Building America Program is reengineering new and existing homes for energy efficiency, energy security, and affordability. This private/public partnership conducts systems research to improve overall housing performance, increase housing durability and comfort, reduce energy use, and increase energy security for America's homeowners. Program activities focus on finding solutions for both new and existing homes, as well as integrating clean onsite energy systems that will allow the homebuilding industry to provide homes that produce more energy than they use.



DOE partners with the U.S. Environmental Protection Agency (EPA) to provide home builders with design and construction best practices so that their new homes achieve the ENERGY STAR® label. DOE partners with the U.S. Department of Housing and Urban Development (HUD) to assist producers of manufactured housing in increasing the energy efficiency of their homes. DOE partners with the residential building industry to develop and implement cost-effective innovative building energy systems—innovations that save builders and homeowners millions of dollars in construction and energy costs.

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The goals of this industry-led, cost-shared partnership program are to:

- ▶ Increase whole house energy efficiency by 40% to 70% and reduce construction time and waste
- ▶ Improve indoor air quality and comfort
- ▶ Integrate clean onsite power systems leading to an additional 10% to 30% in energy savings and Zero Energy Homes
- ▶ Increase the energy efficiency of existing homes by 20% to 30%.

## The Systems-Engineering Approach

The teams design houses from the ground up, considering the interaction between the building envelope, mechanical systems, landscaping, neighboring houses, orientation, climate, and other factors. This systems-engineering approach enables the teams to incorporate energy-saving strategies at little or no extra cost. Examples of innovative design improvements that result from this systems-engineering approach include:

**Advanced framing systems.** By using 2x6 studs on 24-in. spacing instead of the more common 2x4 studs on 16-in. spacing, the builder greatly improves the insulating value of the walls and reduces labor and lumber required to assemble the framing. Structural Insulated Panels (SIPs) and other innovative wall systems create an airtight, highly insulating wall construction.

**Integrated envelope sealing package.** Combinations of taped sheathing systems, air-tight caulking of drywall, and better workmanship lead to lower air infiltration rates and reduce heating and cooling loads on mechanical systems. Mechanical ventilation is often added to ensure adequate fresh air for building occupants.

**Energy-efficient windows.** Low-emissivity coatings and vinyl frames provide much higher levels of thermal insulation than standard windows with clear glass and aluminum frames. In hot climates, an additional spectrally selective coating reduces the amount of solar heat entering the house. Exterior shading and house orientation control solar gains.

## The Results

Each Building America team constructs test homes and develops community-scale projects that incorporate its systems innovations. DOE's National Renewable Energy Laboratory (NREL) provides feedback on the systems-level benefits of energy technologies and design strategies implemented by the teams. Current results show that Building America homes use 40 to 70% less energy than conventional homes and are more comfortable. These results are documented in Building America project summaries, case studies, and on the Building America website at [www.buildingamerica.gov](http://www.buildingamerica.gov).

## Benefits for Builders

Building America helps builders gain a competitive advantage by reducing construction costs and improving the quality of the houses they build:

- ▶ Reduced callbacks and warranty claims
- ▶ Lower material and labor costs during construction
- ▶ Reduced purchase cost of mechanical equipment
- ▶ Less construction waste
- ▶ More options for the same sales price
- ▶ New product opportunities for manufacturers and suppliers
- ▶ Learning from other builders
- ▶ Prominence in the marketplace
- ▶ Advanced onsite power system integration, including photovoltaics and solar hot water
- ▶ Improved air quality and comfort
- ▶ Accelerated development of high performance housing options

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## Benefits for Homeowners

Building America's partnership with builders also provides important benefits to homeowners by improving the quality and affordability of the product they buy:

- ▶ Lower utility bills
- ▶ Greater comfort
- ▶ Better indoor air quality
- ▶ Energy-efficient mortgages
- ▶ Higher resale prices
- ▶ Climate-specific Best Practices for homeowners, realtors and others
- ▶ Contractor training on energy-efficient remodeling practices

## Benefits for the Nation

The energy-efficient, healthy, and environmentally friendly houses created under Building America contribute to a better quality of life for all citizens:

- ▶ Less reliance on fossil fuels
- ▶ Reduced greenhouse gas emissions
- ▶ More affordable homes for first-time homebuyers
- ▶ Lower medical costs resulting from unhealthy or unsafe living conditions
- ▶ Job creation in the energy-efficient building materials and equipment industry
- ▶ Homes of the Future

The research conducted by Building America teams improves the quality and performance of today's homes and provides valuable information for homes of the future. By supporting the development of innovative energy efficiency strategies and integrating onsite power systems, the Building America Program will ultimately develop homes that produce as much energy as they use.

## For More Information

Please see the Partnerships for Home Energy Efficiency website at [www.energysavers.gov](http://www.energysavers.gov) and click on the link to Building America.gov.